

# **CENTRAL VACUUM SYSTEM**

## **UNIVERSAL HOSE END**

### **Field of the Invention**

This invention relates to a central vacuum system and in particular, to fittings and parts used therein.

### **Background of the Invention**

For some time, the central vacuum cleaning industry has had problems with hoses fitting the central vacuum system wall valves. Wall valves are manufactured by at least three North American vendors and three European vendors. At least four different hose manufacturers exist for the hose product that fits into these valves. No common standards exist or are adhered to for the industry. While it has been proposed to develop standards to address concerns over interchangeability, no standards have been developed, nor are apparently close to being developed. Data collected on various wall valves show differences of about 1 millimeter in opening diameters and differences at 1 inch deep of about .50 millimeters. With just a visual view of the various hose ends available, one can tell that large variations exists. The combination of different wall valves and different hose ends causes problems for end users concerning the mating of the hose and the wall plate.

Efforts have been made by various hose manufacturers to address the problem of proper mating of the hose and wall plate. The end designer's responsibility is particularly left to the hose company to solve the problem for the

1 end user. Soft materials, various angles and size of the hose fitting have been tried.  
2 Recently, a hose end with an extended portion providing a small diameter at the  
3 extreme end has appeared and is proposed for solution to the problem.

4 All proposals to date have draw-backs. Soft materials wear and eventually  
5 become too loose. Various angles and diameters fit some, but not all, of the valves  
6 available. The extended portion hose fit covers the broadest range of valves, but  
7 its length will interfere with air performance on the valves designed for thin walls.  
8 Some of the proposed solutions are not solutions at all, as they require the user to  
9 force the hose end into the valve so tightly that it is difficult to remove.

10 To provide a successful design, the hose end must fit into the wall valve so  
11 that it is easily put in place, snug enough to stay in the intended position when the  
12 vacuum is off and engage the anti-rotation device feature in the wall valve. The anti-  
13 rotation feature causes the most serious design problem. All valve openings are  
14 similar at 1.500 inches and typically reduce in diameter at one degree. The hose  
15 ends are made at approximately 1.500 inches OD, and eventually the two parts will  
16 mate and produce a snug fit. This tapered fit is seemingly a good design option in  
17 that variations in size will be accommodated with a tapered design so that the  
18 mating will take place. Unfortunately, the additional requirement of the anti-rotation  
19 device usually only allows a 0.100 inch change in the mating location, not enough  
20 distance to allow for good fit for all the different hose to valve combinations.

21 The soft hose ends have been proposed and come the closest to the  
22 accommodating the wall valve fit issue. The soft end collapses, allowing the user  
23 to push the hose end until the anti-rotation device is engaged. Unfortunately, soft

1 hose ends eventually wear and stress relieve themselves to become an even  
2 smaller size, eventually causing dissatisfaction. The solution is to develop an  
3 adjusting hose fitting outside diameter which can accommodate different internal  
4 diameter wall valve sizes, so that the anti-rotation feature can be engaged over a  
5 much greater distance than 1/10 of an inch. The adjustment feature of the hose  
6 fitting outside diameter must be wear resistant and maintain adequate resistive force  
7 over the life of the part.

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### **Summary of the Invention**

10 The invention consists of a sleeve that is fittable to the vacuum hose end with  
11 the sleeve having flex so as to provide a snug insertion fit of the vacuum hose into  
12 the wall valve receptacle. In the disclosed embodiment, the sleeve is of a rigid  
13 material and has flex leaves or portions.

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### **Objects of the Invention**

16 The objects of the present invention are: to provide a universal fit hose end  
17 fitting which enables different hose ends to be connected to different wall valves of  
18 various manufacturers; to provide such a fitting which is flexible and provides a snug  
19 insertion fit; to provide such a fitting which is long-lasting; to provide such a fitting  
20 which is well-suited for the intended purpose and is economical in price. Other  
21 objects and advantages of the following invention will become apparent from the  
22 disclosure hereafter.

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## **Brief Description of the Drawings**

Fig. 1 is a disassembled perspective view of a vacuum hose fitting sleeve embodying the present invention.

Fig. 2 is a disassembled view of a vacuum hose fitting sleeve with additional connections.

Fig. 3 is a disassembled view of a vacuum hose fitting sleeve.

## **Description of the Preferred Embodiment**

The reference numeral 1, Fig. 1, generally indicates a vacuum hose fitting sleeve embodying the present invention. The sleeve 1 is tubular with outer and inner surfaces 2 and 3. The fitting sleeve 1 is intended to fit between a central vacuum cleaning system wall valve 5 and a vacuum hose 6. The vacuum hose 6 is inserted into the fitting sleeve 1 and then the fitting sleeve 1 is inserted into the wall valve 5. The fitting sleeve 1 provides a substantially universal fit between wall valves 5 and vacuum hoses 6 of different manufacturers. There are a plurality of wall valve manufacturers and vacuum hose manufacturers with no established standards within the industry. Most wall valves have a 1.5 inch opening for receipt of the vacuum hose end, but dimensions vary, tapers vary, and there can be imperfect fits between various vacuum hoses and wall valves. The fitting sleeve 1 is designed to provide a tight snug leak-free, or substantially leak-free fit between vacuum hoses and wall valves of different manufacturers in order to provide greater freedom in choosing and selecting components for suppliers and purchases of central vacuum cleaning systems.

1 Referring to Fig. 2, a conduit 8 extends to central vacuum cleaning  
2 apparatus, typically located in a garage, closet or basement in a dwelling. The  
3 conduit 8 terminates in attachment to the wall valve 5 which consists of a cover plate  
4 10 having a tubular boss 11 extending therethrough. The boss is typically 1.5  
5 inches in diameter with the boss being open at one end and connected to the  
6 conduit 8 at the other. Electrical connections 13 extend into the boss, provide an on-  
7 signal to turn on the central vacuum cleaning system motor. This method of on/off  
8 is not always required in the design. Additional electrical connections to provide  
9 power for attachments, such as rotating rug cleaning may be attached to the remote  
10 end of the vacuum hose 6. By enlarging the sleeve cover 4, these additional  
11 electrical connections can be completed. Typically, ribs 15 project from the cover  
12 plate 10 and provide an anti-rotation stop to mating portions so that electrical  
13 connections are not disturbed.

14 The fitting sleeve 1 has a first end 17 sized to fit snugly within the boss 11,  
15 wherein the boss 11 is of the general size within the industry, typically 1.5" diameter.  
16 The fitting sleeve 1 is preferably of a rigid, or semi-rigid material, such as molded of  
17 ABS plastic, and the first end 17 is provided with mechanical elements to enable flex  
18 of the rigid material. In the illustrated embodiment, flex is provided by slots 18  
19 forming leaves 19 between a plurality of peripherally placed slots 18. The leaves  
20 19 are free to flex inwardly to accommodate a snug fit between the first end 17 and  
21 the boss 11. Referring to Fig. 3, a second end 21 of the sleeve 1 projects outwardly  
22 when the sleeve 1 is inserted into the wall valve 5 and is sized to generally receive  
23 a second end 23 of the vacuum hose 6, the vacuum hose first end 24 being

1 positioned some feet away for connection to the cleaning attachment tools. Sleeve  
2 1 supports a hose and sleeve cover 4 and screws extend through the cover into the  
3 unlocking hose and sleeve. A shoulder 26 is formed between the sleeve first end  
4 17 and the second end 21 and provides an abutment for an "O" ring seal 29 which  
5 provides effective sealing against the area of the wall valve 5 surrounding the  
6 entrance to the boss 11. A tab 31 upstanding from the second end 21 and  
7 immediately aft of the "O" ring seal 29 mates against the face of the wall valve 5 and  
8 nests between the wall valve spaced ribs 15 so as to prevent relative rotation of the  
9 sleeve 1 and wall valve 5. Various types of seals or no seal could be used. A pair  
10 of screws 33 are opposed and extend through the wall of the sleeve 1 at the second  
11 end 21 immediately aft of the anti-rotation tab 31. The screws 33 hold the hose and  
12 sleeve cover in place on the sleeve 1. Many alternate methods for fastening this  
13 cover in place exist, threads and other mechanical locks or plastic joining technology  
14 like ultrasonic or spin welding.

15 The material of the sleeve 1 is wear-resistant and the design of the flexible  
16 means, such as the slots 18 and leaves 19 is selected to maintain adequate spring  
17 force over the life of the part.

18 Clearly, many modifications in variations of the present dimension are  
19 possible in light of the above teachings. For example, other means for providing flex  
20 may be considered. Additionally, the entire sleeve may be constructed of a material  
21 which is in itself resilient and yet sufficiently sturdy for long-life. Certain  
22 compressible plastics may be beneficial in use. The same use of flex leaves  
23 possessing no electrical connection to a multitude of connections either through the

1 wall plate or through an extension cord entering this wall end, or combination of  
2 electrical connections through wall plate or otherwise are within the scope of this  
3 invention. Additionally, the seal can be made from any material in alternate shapes  
4 than an "O" ring, or excluded from the design entirely. Different methods of  
5 developing the combination of the sleeve 1 and cover 4, the cover can be  
6 manufactured with hose side of sleeve 1 in place. Thus, the forward portion of  
7 sleeve 1 that mates with boss 5 could be affixed to the previously mentioned piece.

8 Further, a one piece design can be developed. Such a hose is trapped by  
9 the hose side and secured, for example, by internal threads and the opposite end  
10 is designed to mate with the boss 11. The cover would be equipped with internal  
11 threads, and an extended front possessing the recessing flex characteristics.

12 Yet other embodiments may be encountered which do not depart from the  
13 concept and claims of the present invention. It is to be understood therefore, that  
14 the invention can be practiced otherwise as specifically described.

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